I claim:

1. A polyphase rotating-access switch comprising:

a plurality of ingress modules;

a plurality of egress modules; and

at least two latent space switches, each of said at least two latent space switches operable to provide a path from each of said ingress modules to each of said egress modules wherein said path is characterized by a constant switching delay specific to said each of said at least two latent switches.

2. The polyphase rotating-access switch of claim 1 wherein each of said at least two latent space switches comprises:

a bank of transit memory devices;

a primary rotator having a plurality of primary input ports each connecting to one of said ingress modules and a plurality of primary output ports each connecting to one of said transit memory devices; and

a secondary rotator having a plurality of secondary input ports each connecting to one of said transit memory devices and a plurality of secondary output ports each connecting to one of said egress modules.

3. The polyphase rotating-access switch of claim 2 wherein said primary rotator is operable to connect each of said primary input ports to each of said transit memory devices and said secondary rotator is operable to connect each of said transit memory devices to each of said secondary output ports during a rotation cycle comprising a plurality of rotation phases.

4. The polyphase rotating-access switch of claim 3 wherein, during each of said rotation phases, each of said primary input ports connects to a respective one of said transit memory devices through said primary rotator, said respective one of said transit memory devices being determined according to a primary rotation configuration specific to each of said latent space switches.

5. The polyphase rotating-access switch of claim 4 wherein, during each of said rotation phases, each of said transit memory devices connects to a respective one of said secondary output ports through said secondary rotator, said respective one of said secondary output ports being determined according to a secondary rotation configuration specific to each of said latent space switches.

6. The polyphase rotating-access switch of claim 5 wherein said primary rotation configuration and said secondary rotation configuration of each of said latent space switches have opposite directions so that the delay between the time at which a specific primary input port accesses each of said transit memory devices and the time at which said each of said transit memory devices accesses a specific secondary output port is constant.

7. The polyphase rotating-access switch of claim 6 wherein:

said primary rotation configuration is the same for each of said latent space switches;

said secondary rotation configuration is the same for each of said latent space switches;

each of said ingress modules connects to selected primary input ports, one from each of said plurality of primary input ports of each of said latent space switches; and

each of said egress modules connects to selected secondary output ports, one from each of said plurality of secondary output ports of each of said latent space switches.

8. The polyphase rotating-access switch of claim 7 wherein said selected primary input ports and said selected secondary output ports are determined so that the switching delays from said each of said ingress modules to said each of said egress modules through said latent space switches are staggered over said rotation cycle.

9. The polyphase rotating-access switch of claim 6 wherein:

the primary rotation configuration of at least one of said latent space switches is phase shifted with respect to the primary rotation configuration of at least another one of said latent space switches;

the secondary rotation configuration is the same for each of said latent space switches;

each of said ingress modules connects to selected primary input ports, one from each of said plurality of primary input ports of each of said latent space switches; and

each of said egress modules connects to selected secondary output ports, one from each of said plurality of secondary output ports of each of said latent space switches.

10. The polyphase rotating-access switch of claim 6 wherein:

the primary rotation configuration is the same for each of said latent space switches;

the secondary rotation configuration of at least one of said latent space switches is phase shifted with respect to the secondary rotation configuration of at least another one of said latent space switches;

each of said ingress modules connects to selected primary input ports, one from each of said plurality of primary input ports of each of said latent space switches; and

each of said egress modules connects to selected secondary output ports, one from each of said plurality of secondary output ports of each of said latent space switches.

11. The polyphase rotating-access switch of claim 6 wherein said primary rotator is programmable to select the one of said transit memory devices to which each of said primary input ports connects during each of said rotation phases.

12. The polyphase rotating-access switch of claim 6 wherein said secondary rotator is programmable to select the one of said secondary output ports to which each of said transit memory devices connects during each of said rotation phases.

13. The polyphase rotating-access switch of claim 6 wherein each of said ingress modules is combined with a respective one of said egress modules to form an integrated switch module.

14. The polyphase rotating-access switch of claim 13 wherein said integrated switch module is a common-memory switch module.

15. A method of scheduling transfer of data in a polyphase rotating-access switch that includes a plurality of ingress modules, a plurality of egress modules, and at least two latent space switches connecting the ingress modules to the egress modules, the method comprising:

creating tables of switching delays from each of said ingress modules to each of said egress modules across said latent space switches;

determining a set of paths from said each of said ingress modules to said each of said egress modules, each of said paths associated with one of said latent space switches and having a corresponding switching delay;

sorting said set of paths into a sorted list according to an ascending order of switching delays;

receiving a connection request indicating a specified ingress module, a specified egress module and a specified capacity allocation; and

selecting, from the sorted list associated with said specified ingress module and specified egress module, the first path having a free capacity at least equal to said specified capacity allocation.

16. The method of claim 15 further comprising rejecting the connection request if none of the paths associated with said specified ingress module and specified

egress module has a free capacity free capacity at least equal to said specified capacity allocation.

17. A polyphase circulating switch comprising:

a plurality of switch modules each having a module controller;

a first plurality of clockwise rotators each of said clockwise rotators having a respective phase reference; and

a second plurality of counterclockwise rotators each of said counterclockwise rotators having a respective phase reference;

wherein each of said switch modules is communicatively connected to at least one of said clockwise rotators and to at least one of said counterclockwise rotators.

18. The polyphase circulating switch of claim 17 wherein each of said clockwise rotators is operable to connect each of said switch modules to each other of said switch modules during a rotation cycle, where said rotation cycle includes a plurality of rotation phases, and each of said counterclockwise rotators is operable to connect each of said switch modules to each other of said switch modules during said rotation cycle.

19. The polyphase circulating switch of claim 17 further comprising:

a plurality of module controllers, each module controller of said plurality of module controllers associated with a switch module of said plurality of switch modules; and

a master controller operable to:

determine a schedule for data exchange among the switch modules; and

transmit said schedule to said each module controller.

20. The polyphase circulating switch of claim 19 wherein the master controller is further operable to receive a connection request and select one of said clockwise

rotators and one of said counterclockwise rotators for routing the requested connection.

21. The polyphase circulating switch of claim 19 wherein the master controller is further operable to determine a switching delay from each of said switch modules to each other of said switch modules through each of said clockwise rotators and through each of said counterclockwise rotators.

22. The polyphase circulating switch of claim 17 wherein at least one of said clockwise rotators is programmable to set its phase reference.

23. The polyphase circulating switch of claim 22 wherein the phase references of said plurality of clockwise rotators are evenly spread over said rotation cycle.

24. The polyphase circulating switch of claim 17 wherein at least one of said counterclockwise rotators is programmable to set its phase reference.

25. The polyphase circulating switch of claim 24 wherein the phase references of said plurality of counterclockwise rotators are evenly spread over said rotation cycle.

26. A method of scheduling a connection in a polyphase circulating switch that includes a plurality of switch modules interconnected by at least two mutually phase-shifted rotators, a request for the connection specifying a source switch module, a destination switch module, and a required capacity, the method comprising:

determining a switching delay for at least two candidate paths, each path traversing a corresponding rotator,

selecting from the at least two candidate paths a candidate path having the least switching delay; and

scheduling capacity along said candidate path having the least switching delay.

27. The method of claim 26 further comprising determining switching delays from each of said switch modules to each other of said switch modules through each of

said at least two mutually phase-shifted rotators and storing said switching delays for frequent use.

28. A constellation comprising:

a plurality of switch modules;

an array of rotators including a plurality of rotators, each rotator of said plurality of rotators having a plurality of inlets and a plurality of outlets, where said plurality of inlets and said plurality of outlets are communicatively connected to said plurality of switch modules and where said each rotator is operable to cyclically connect each switch module of said plurality of switch modules to each other switch module of said plurality of switch modules by a cyclical connecting of individual inlets among said plurality of inlets to individual outlets among said plurality of outlets;

a master controller associated with at least one rotator of said array of rotators said master controller including a master timing circuit; and

a module controller associated with each switch module of said plurality of switch modules, said module controller including a module timing circuit for time-locking to said master timing circuit.

29. The constellation of claim 28 wherein said plurality of rotators are arranged in two rotator groups, one rotator group including at least one clockwise rotator performing said cyclical connecting in a clockwise order and the other rotator group including at least one counterclockwise rotator performing said cyclical connecting in a counterclockwise order.

30. The constellation of claim 28 wherein said plurality of switch modules are geographically distributed over a wide area.

31. The constellation of claim 30 wherein said each switch module has a link to said array of rotators, said link carrying a plurality of wavelength channels, each wavelength channel in said plurality of wavelength channels connecting to a corresponding rotator in said array of rotators.

32. The constellation of claim 31 further comprising, in said module controller, a plurality of additional timing circuits such that said module controller includes a timing circuit corresponding to each rotator in said array of rotators, where said timing circuit and said plurality of additional timing circuits are adapted to time-lock said switch module to said master timing circuit along each wavelength channel of said plurality of wavelength channels.

33. The constellation of claim 32 where said array of rotators is a first array of rotators, said master controller is a first master controller and said link associated with said each switch module is a first link, said constellation further comprising:

a second array of rotators arranged in complementary rotator pairs; and

a second master controller associated with said second array of rotators;

wherein said each switch module has a second link to said second array of rotators, said link carrying a plurality of wavelength channels, each wavelength channel in said plurality of wavelength channels of said second link connecting to a corresponding rotator in said second array of rotators.

34. The constellation of claim 33 wherein said first array of rotators includes an even number of rotators exceeding two and said complementary rotator pairs are mutually phase shifted.

35. The constellation of claim 33 wherein said second array of rotators includes an even number of rotators exceeding two and the complementary rotator pairs are mutually phase shifted.

36. A network of constellations comprising:

a plurality of constellations, each constellation of said plurality including a plurality of switch modules interconnected by at least one array of rotators;

a multiple-wavelength-channel link from a rotator array of a first constellation of said plurality of constellations to a switch module of a second constellation of said plurality of constellations; and

a multiple-wavelength-channel link from said switch module of said second constellation to a rotator array in said second constellation.

37. The network of claim 36 further comprising a plurality of master controllers, each master controller of said plurality of master controllers associated with a corresponding one of said arrays of rotators and a plurality of module controllers, each module controller associated with a corresponding one of said switch modules.

38. The network of claim 37 wherein said each master controller includes a master timing circuit and said each module controller includes at least one module timing circuit for time-locking to one of said master timing circuits.

39. The network of claim 38 wherein said time locking is performed along each wavelength channel in said multiple-wavelength-channel link.